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EXAMINER	
TORRES, JUAN A	

ART UNIT	PAPER NUMBER
2631	

DATE MAILED: 05/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/989,367	AGAZZI, OSCAR E.	
	Examiner	Art Unit	
	Juan A. Torres	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 November 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-50* is/are rejected.

7)☒ Claim(s) *47 and 48* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 November 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "1307" has been used to designate both an optical to electrical converter (see figure 13 and page 20 line 2 of the specification) and Decisions (figure 14A and page 21 lines 9, 12 page 23 lines 5, 14, 17). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

a) "101" (see page 6 line 22 of the specification).

b) "1427" (see page 22 lines 30 and 32 of the specification).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Figures 1 to 12 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to because in figure 14A there are lines that have not been printed inside of block 1401. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must

be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because it exceeds 150 words. Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities: in page 19 lines 25-30 the specification makes reference to Appendix A, that is not included in the disclosure.

Appropriate correction is required.

Claim Objections

Claim 6 is objected to because of the following informalities: in page 1 of claim 7 the recitation "converting the look up table" is improper a look up table have not been mention before (there is insufficient antecedent basis for this limitation in the claim); it is suggested to be changed to "converting a look up table". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 47 and 48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 45 is a claim that describes a method and claims 47 and 48 make mention to an apparatus. Claims 44 and 45 already includes the limitations mentioned in claims 47 and 48.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Sands ("Non-linear identification on the digital magnetic recording channel", Twenty-Fifth Asilomar Conference on Signals, Systems and Computers, 4-6 Nov. 1991 Page(s):6 - 10 vol.1).

As per claim 1 Sands discloses a method for modeling the behavior of a data channel the method comprising determining a sequence of data input to the data channel (figure 1 x_k pages 6-7 section 2.1); using at least part of the sequence of data input to the data channel as an index to a channel model value (figure 1 x_k pages 6-7 section 2.1); sampling the data after it has passed through the channel to produce a sampled value (figure 1 y_k pages 6-7 section 2.1); comparing the channel model value with the sampled value (figure 1 $y_k - \hat{y}_k$ pages 6-7 section 2.1); and adjusting the channel model value based on the results of the comparison between the channel model value and the sampled value (page 9 section 2.6).

As per claim 2 Sands discloses determining a sequence of data input to the data channel comprises determining the last N bits input to the channel (figure 1 x_k pages 6-7 section 2.1).

As per claim 3 Sands inherently discloses where N=5 (pages 6-7 section 2.1).

As per claim 4 Sands discloses that the sampling of the data after it has passed through the channel to produce a sampled value comprises producing a real number representing the sampled value ($y_{k,i}$ pages 6-7 section 2.1).

As per claim 5 Sands discloses adjusting the channel model value further comprises adjusting the channel model value according to an LMS (Least Means Squared) algorithm (page 9 section 2.6).

As per claim 6 Sands discloses adjusting the channel model value further comprises adjusting the channel model value until it converges (page 9 section 2.6).

As per claim 7 Sands discloses comprising converting the look up table into Volterra Kernels (pages 6-7 section 2.1).

As per claim 8 Sands discloses converting the look up table into Volterra Kernels using a Hadamard transform (page 7 section 2.2).

As per claim 9 Sands discloses adjusting the Volterra Kernels based on the results of the comparison between the channel model value and the sampled value (page 9 section 2.6).

As per claim 10 Sands discloses eliminating the insignificant Volterra Kernels (pages 7-8 section 2.4).

As per claim 11 Sands discloses a method for modeling the behavior of a data channel the method comprising determining a sequence of data input to the data channel (figure 1 x_k pages 6-7 section 2.1); determining a Volterra Series representation of the channel (figure 1 pages 6-7 section 2.1); accepting at least part of the sequence of data input to the data into the Volterra series representation of the channel to

produce a channel model value (figure 1 pages 6-7 section 2.1); sampling the data after it has passed through the channel to produce a sampled value (figure 1 y_k pages 6-7 section 2.1); comparing the channel model value with the sampled value (figure 1 $y_k - \hat{y}_k$ pages 6-7 section 2.1); and adjusting the channel model value based on the results of the comparison between the channel model value with the sampled value (page 9 section 2.6).

As per claim 12 Sands discloses accepting a most recent value of the sequence of data input to the data channel (x_k pages 6-7 section 2.1); accepting the most recent value of the sequence of data input to the data channel into a first FIR (Finite Impulse Response) filter (page 9 section 3); accepting a product of the most recent value of the sequence of data input to the data channel and a second most recent value of the sequence of data input to the data channel into a second FIR (page 9 section 3); and summing an output of the first FIR and output of the second FIR to form the channel model value (page 9 sections 2.6 and 3).

As per claim 13 Sands discloses accepting a most recent value of the sequence of data input to the data channel (x_k pages 6-7 section 2.1); accepting the most recent value of the sequence of data input to the data channel into a first FIR filter (page 9 section 3); accepting a product of the most recent value of the sequence of data input to the data channel and the second most recent value of the sequence of data input to the data channel into a second FIR (page 9 section 3); accepting a product of the most recent value of the sequence of data input to the data channel and a third most recent value of the sequence of data input to the data channel into a third FIR (page 9 section

3); and summing an output of the first FIR and output of the second FIR and output of the third FIR to form the channel model value (page 9 sections 2.6 and 3)

As per claim 14 Sands discloses accepting a most recent value of the sequence of data input to the data channel (x_k pages 6-7 section 2.1); accepting the most recent value of the sequence of data input to the data channel into a first FIR filter (page 9 section 3); accepting a product of the most recent value of the sequence of data input to the data channel and the second most recent value of the sequence of data input to the data channel into a second FIR (page 9 section 3); accepting a product of the most recent value of the sequence of data input to the data channel and a third most recent value of the sequence of data input to the data channel into a third FIR (page 9 section 3); accepting a product, the product being the most recent value of the sequence of data input to the data channel and the two next most recent data input, into a fourth FIR (page 9 section 3); and summing an output of the first FIR and output of the second FIR and output of the third FIR and output of the fourth FIR to form the channel model value (page 9 sections 2.6 and 3).

As per claims 15-18 Sands discloses the difference between the channel model value and the output of the channel is used to update all the FIRs (page 9 section 2.6).

As per claims 19-22 Sands discloses that an LMS algorithm is used to update all the FIRs (page 9 section 2.6).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 23-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaguchi (US 4747094) and further in view of Cancellation of Bellini ("Nonlinear cross talk cancellation for high density optical recording", Global Telecommunications Conference, 1999. GLOBECOM '99 Volume 1B, 1999 Page(s): 933 - 938 vol. 1b).

As per claim 23 and 30 Sakaguchi discloses a method for equalizing an optical signal, modulated with a digital signal, received over an optical channel comprising converting the optical signal into an electrical signal (figure 1 column 4 lines 25-58). Sakaguchi doesn't specifically disclose summing the electrical signal with a correction signal; providing the summed signal to a detector; detecting the summed signal to produce decisions; providing the decisions to a nonlinear channel estimator; and estimating the correction signal in the nonlinear channel estimator. Bellini discloses an equalizer summing the electrical signal with a correction signal (figure 2 page 935 section 3.2); providing the summed signal to a detector (figure 2 Viterbi detector page 935 section 3.2); detecting the summed signal to produce decisions (figure 2 $\hat{a}_n$ page 935 section 3.2); providing the decisions to a nonlinear channel estimator (figure 3 page 935 section 4); and estimating the correction signal in the nonlinear channel estimator (figure 3 pages 935-936 section 4). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The

suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 23 and 30.

As per claims 24 and 31 Bellini discloses accepting the decisions (figure 3 pages 935-936 section 4); predicting the inter-symbol interference of the channel in a nonlinear channel estimator (figure 3 pages 935-936 section 4); and forming a correction signal from the predicted inter-symbol interference (figure 3 pages 935-936 section 4). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 24 and 31.

As per claims 25 and 32 Bellini discloses providing the decisions to a plurality of Volterra Kernels (page 934 section 3.1 and figure 3 pages 935-936 section 4); and summing the output of the plurality Volterra Kernels to form a correction signal (page 934 section 3.1 and figure 3 pages 935-936 section 4). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce

the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 25 and 32.

As per claims 26 and 33 Bellini discloses comparing the predicted inter-symbol interference to inter-symbol interference in the electrical signal (page 934 section 3.1 and figure 3 pages 935-936 section 4); and updating the Volterra Kernels based on the result (page 934 section 3.1 and figure 3 pages 935-936 section 4). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 26 and 33.

As per claims 27 and 34 Bellini discloses using a LMS (Least Means Squared) algorithm to update the Volterra Kernels (page 934 section 3.1 and figure 3 pages 935-936 section 4). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 27 and 34.

As per claims 28 and 35 Bellini discloses providing the data decisions as an address into a look up table (page 937 first paragraph section 5.2, page 934 section 3.1 and figure 3 pages 935-936 section 4); outputting a value stored in the look up table as the predicted inter-symbol interference (page 937 first paragraph section 5.2, page 934 section 3.1 and figure 3 pages 935-936 section 4); comparing the predicted inter-symbol interference to the inter-symbol interference in the electrical signal (page 937 first paragraph section 5.2, page 934 section 3.1 and figure 3 pages 935-936 section 4); and updating the value stored in the look up table based on the result (page 937 first paragraph section 5.2, page 934 section 3.1 and figure 3 pages 935-936 section 4). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 28 and 35.

As per claims 29 and 36 Bellini discloses using a LMS (Least Means Squared) algorithm (page 937 first paragraph section 5.2, page 934 section 3.1 and figure 3 pages 935-936 section 4). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The

suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 29 and 36.

As per claims 37 and 40 Bellini discloses a method for decoding a signal received over an optical channel, the method comprising receiving a signal including linear and non linear components (figure 2 page 935 section 3.2); estimating, in a non linear channel estimator, the expected values of the received signal (figures 2 and 3 pages 935-936 sections 3.2 and 4); computing the branch metrics based on the expected values of the received signal (figure 2 page 935 section 3.2 first paragraph); providing the computed branch metrics to a Viterbi decoder(figure 2 page 935 section 3.2 first paragraph); and Viterbi decoding the received signal using the branch metrics provided to the Viterbi decoder (figure 2 page 935 section 3.2 first paragraph). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 37 and 40.

As per claims 38 and 41 Bellini discloses providing the value of the received signal to a Volterra kernel estimator (figure 2 page 935 section 3.2 first paragraph); and computing the expected value sent based on the output of the Volterra kernel estimator

(figure 2 page 935 section 3.2 first paragraph). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 38 and 41.

As per claims 39 and 42 Bellini discloses providing the value of the received signal as an address to a look up table (page 937 first paragraph section 5.2, page 934 section 3.1 and figure 3 pages 935-936 section 4); and looking up the stored value as the actual value transmitted (page 937 first paragraph section 5.2, page 934 section 3.1 and figure 3 pages 935-936 section 4). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 39 and 42.

As per claims 43 and 46 Sakaguchi discloses a method for detecting digital data modulated on an optical signal and received over an optical channel, the method comprising converting the optical signal to an electrical signal (figure 1 column 4 lines 25-58); converting the electrical signal to a multibit digital representation (figure 1

column 4 lines 25-58); estimating distortion introduced in the optical signal by the optical channel (figure 1 column 4 lines 25-58). Sakaguchi doesn't specifically disclose compensating the multibit digital representation for the distortion; and detecting the digital data from the compensated multibit digital representation. Bellini discloses compensating the multibit digital representation for the distortion (figure 2 page 935 section 3.2); and detecting the digital data from the compensated multibit digital representation (figure 2 $\hat{a}_n$ page 935 section 3.2). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 43 and 46.

As per claims 44, 47 and 49 Bellini discloses estimating in a Volterra Kernel estimator the distortion introduced in the optical channel (figure 2 page 935 section 3.2). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 44, 47 and 49.

As per claims 45, 48 and 50 Bellini discloses estimating in a lookup table estimator the distortion introduced in the optical channel (page 937 first paragraph section 5.2, page 934 section 3.1 and figure 3 pages 935-936 section 4). Sakaguchi and Bellini are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the optical channel receiver disclosed by Sakaguchi nonlinear estimator disclosed by Bellini. The suggestion/motivation for doing so would have been to reduce the nonlinear ISI (Bellini page 933 section 1). Therefore, it would have been obvious to combine Sakaguchi with Bellini to obtain the invention as specified in claims 45, 48 and 50.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Agarossi (US 6600794 B1) discloses a method and device for nonlinear maximum likelihood sequence estimation by removing non-linear inter-symbol-interference (ISI) from a received signal. Benedetto "Principles of Digital Transmission with wireless applications", Kluwer Academic, 1999, chapter 14 "Digital transmission over nonlinear channels presents a classic discussion of the subject including a good bibliography. Giannakis includes a very detail bibliography of 1410 references on the subjects with prior date.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is (571) 272-3119. The examiner can normally be reached on Monday-Friday 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Juan Alberto Torres
04-21-2005

M. G/

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER